



U.S. DEPARTMENT OF AGRICULTURE
 FOREST SERVICE, REGION 1
CONSTRUCTION PLANS FOR:
NF COTTONWOOD CREEK AOP
CULVERT REPLACEMENT

NFSR 1504 MP 10.3

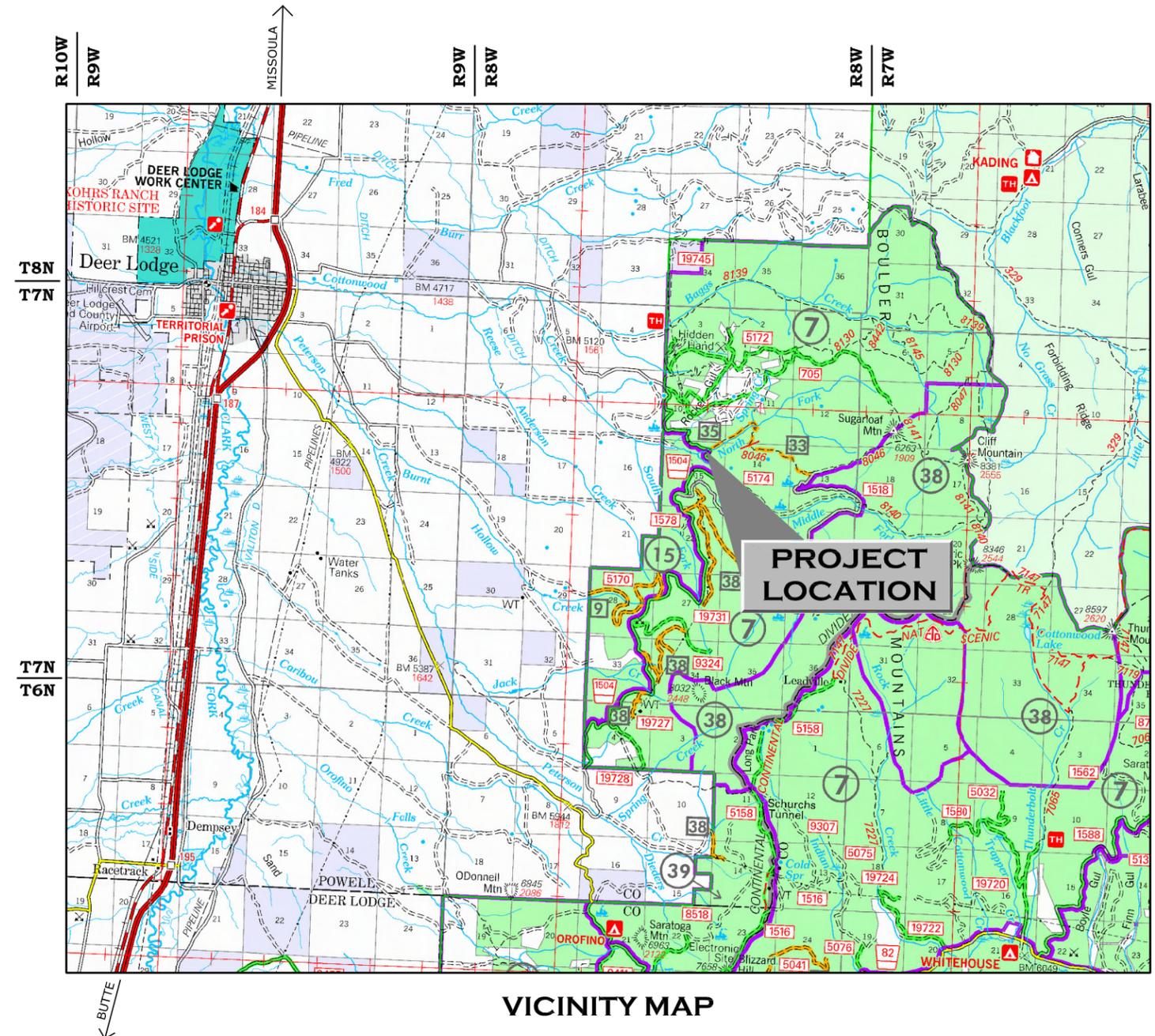
BEAVERHEAD-DEERLODGE NATIONAL FOREST
 PINTLER RANGER DISTRICT
 DEERLODGE COUNTY, MONTANA



PROJECT LOCATION

LOCATION MAP

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NO.	DESCRIPTION
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8	PRECAST FOOTING DETAILS
9	STREAM DETAILS
10	STREAM DEWATERING REQUIREMENTS
XS1 - XS3	ROAD CROSS SECTIONS



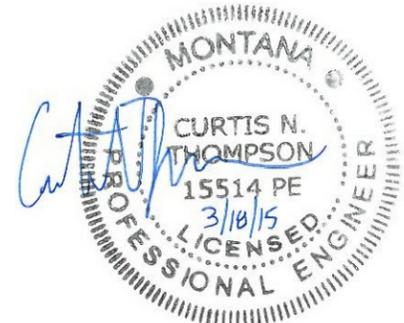
VICINITY MAP

MATERIAL SOURCES	
GOVERNMENT FURNISHED	
Waste Site	
CONTRACTOR FURNISHED	
Coarse Granular Backfill (for geocell)	
Crushed Aggregate	
Riprap	

RECOMMENDED: _____ DATE _____
 DISTRICT RANGER
 PINTLER RANGER DISTRICT

REVIEWED: _____ DATE _____
 FOREST ENGINEER
 BEAVERHEAD-DEERLODGE NATIONAL FOREST

APPROVED: _____ DATE _____
 FOREST SUPERVISOR
 BEAVERHEAD-DEERLODGE NATIONAL FOREST



SUMMARY OF ESTIMATED QUANTITIES

ITEM NO.	ITEM DESCRIPTION	MEASUREMENT		QUANTITY
		METHOD	UNIT	
15101	MOBILIZATION	LSQ	Lump Sum	1
15221	CONSTRUCTION STAKING	LSQ	Lump Sum	1
15102	EQUIPMENT WASHING	LSQ	Lump Sum	1
15202	STAKE CLEANUP	LSQ	Lump Sum	1
15401	CONTRACTOR TESTING	LSQ	Lump Sum	1
15713	SOIL EROSION & POLLUTION CONTROL	LSQ	Lump Sum	1
15730	DEWATERING	LSQ	Lump Sum	1
20301	REMOVAL OF EXISTING 64"x43" CORRUGATED STEEL PIPE-ARCH	AQ	Each	1
20806	STRUCTURE EXCAVATION	LSQ	Lump Sum	1
25101	PLACED RIPRAP, CLASS 5, MACHINE PLACED (CONTRACTOR FURNISHED)	CQ	Cubic Yard	80 *
25150	GRADE CONTROL, ROCK WEIR (CONTRACTOR FURNISHED)	AQ	Each	6
27201	GEOCELL ABUTMENT STABILIZATION	CQ	Square Yard	108
30809	CRUSHED AGGREGATE, SURFACING, COMPACTION METHOD 2 (CONTRACTOR FURNISHED)	CQ	Cubic Yard	100
553A02	PRECAST CONCRETE MEMBER, CULVERT FOOTING	AQ	Linear Foot	158
60304	13' SPAN, 5'-1" RISE STRUCTURAL PLATE ARCH, 6"x2" CORRUGATIONS, 0.111" THICKNESS	AQ	Linear Foot	78
62201	EQUIPMENT RENTAL, HYDRAULIC EXCAVATOR WITH THUMB	AQ	Hour	8
62202	EQUIPMENT RENTAL, LARGE DUMP TRUCK	AQ	Hour	8

* Material salvaged from the excavation meeting the Class 5 Riprap gradation requirements may be used.

CQ= Contract Quantity (See SECTION 109.02(b) of the STANDARD SPECIFICATIONS)
 AQ= Actual Quantity; LSQ = Lump Sum Quantity

GENERAL NOTES

DESIGN: This structure is designed for HL-93 live loading in accordance with AASHTO LRFD Bridge Design Specifications, 6th edition.

HYDROLOGY AND HYDRAULICS: This structure has been designed to pass a flood of 121 cfs (Q100) with a Headwater Depth to Culvert Rise ratio less than 1.

SPECIFICATIONS: Construct the project in compliance with Federal Highway Administration Standard Specifications for Construction of Road and Bridges on Federal Highway Projects (FP-03) and applicable Forest Service Supplemental Specifications.

EROSION CONTROL PLAN: Submit a Dewatering and Soil Erosion and Sediment Control Plan to the Contracting Officer for approval at least fourteen (14) days prior to beginning work. See Section 157 of the Supplemental Specifications for details. Construct temporary means to divert the flow of the live stream as necessary to perform work. Do not pump water from excavations directly into the live stream.

DISPOSAL: All materials designated for removal become the property of the Contractor and are to be disposed of by removing from site in an environmentally safe manner in accordance with all Local, State and Federal requirements.

TEMPORARY TRAFFIC CONTROL: Contractor must maintain traffic on the existing road during construction of the new culvert. See Section 156.03 of the Supplemental Specifications for road closure limitations. Submit a Temporary Traffic Control Plan to the Contracting Officer for approval at least 30 days prior to intended use. Temporary traffic control is incidental to other items.

CONCRETE: Use Class A(AE) Concrete for Precast members. The required 28-day compressive strength (F'c) is 5000 psi with an entrained air content of 5% ± 1%. Finish all precast elements with an ordinary surface finish. Make all concrete in accordance with an approved mix design. Chamfer all exposed edges of concrete 3/4" and fillet all acute angles 3" unless otherwise noted.

REINFORCING STEEL: Use reinforcing steel of the deformed type conforming to AASHTO M31 (ASTM A615) Grade 60. Concrete cover is as shown; where not shown it must conform to AASHTO. Cut and bend reinforcing steel in conformance with ACI 315. Lap splice bars 2' min.

HARDWARE AND STRUCTURAL STEEL: Use shapes, plates and bars meeting the requirements of ASTM A36, unless otherwise specified in these plans. Use hardware meeting the requirements of ASTM A325, except as noted in the drawings.

WELDING: Weld in accordance with the Structural Welding Code, AWS D1.1. A certified welder is required.



REGION ONE

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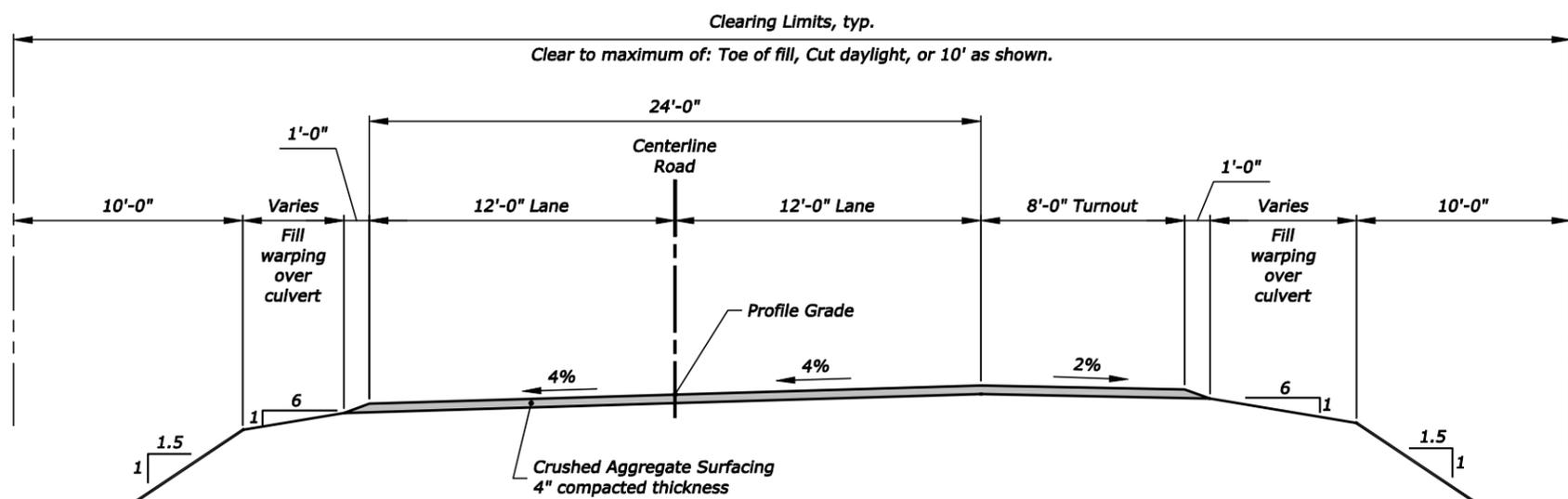
DESIGN	CT	PROJ. NO.	6389
DRAWN	KG	DATE	Mar-15
CHECKED	MJ	SURVEYED	DJA

DJA, P.C.
 CONSULTING ENGINEERS & LAND SURVEYORS
 3203 Russell Street, Missoula, Montana 59801-8591
 Phone 406/721-4320 Fax 406/549-8371

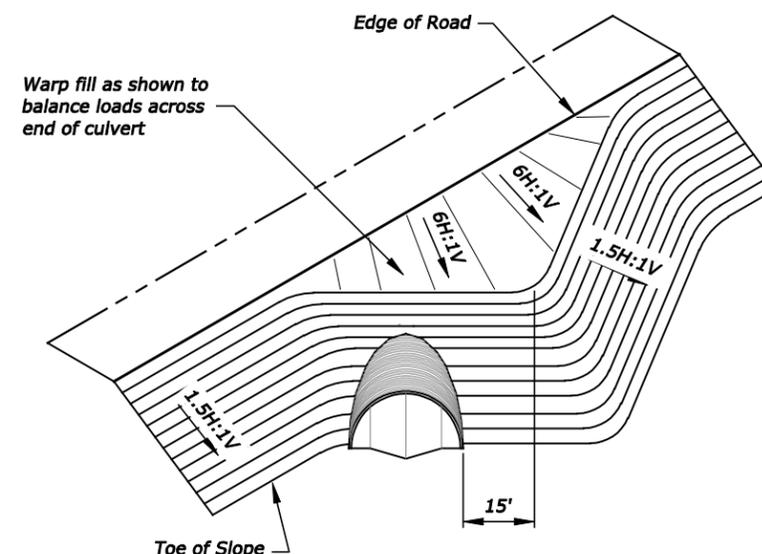
**USFS BEAVERHEAD-DEERLODGE NF
 NF COTTONWOOD CREEK
 NFSR 1504 MP 10.3**

ESTIMATED QUANTITIES & GENERAL NOTES

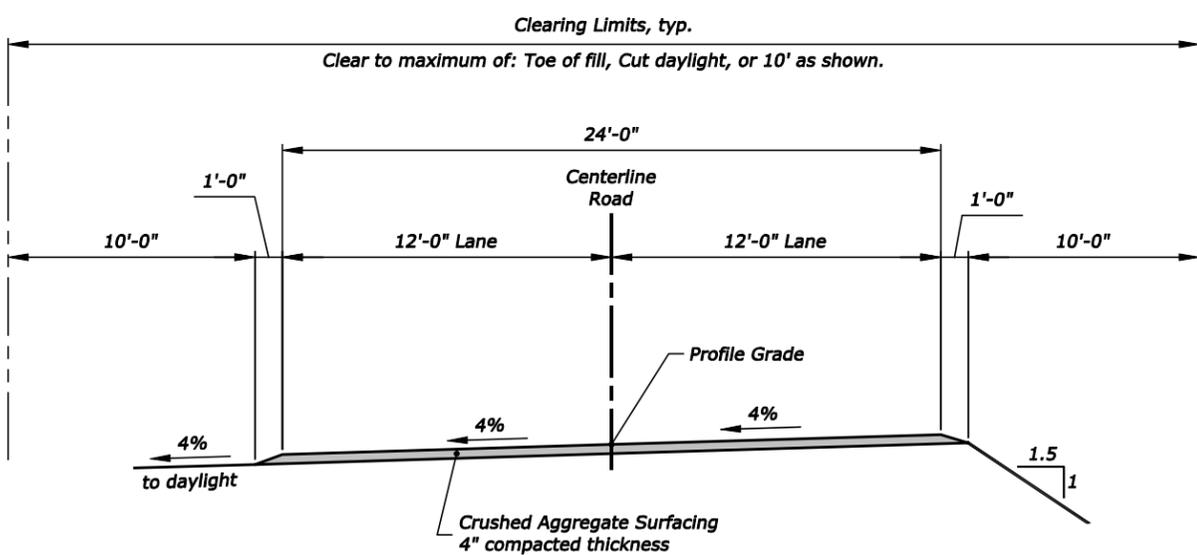
SHEET	OF
2	10



STA 81+00 to STA 82+30

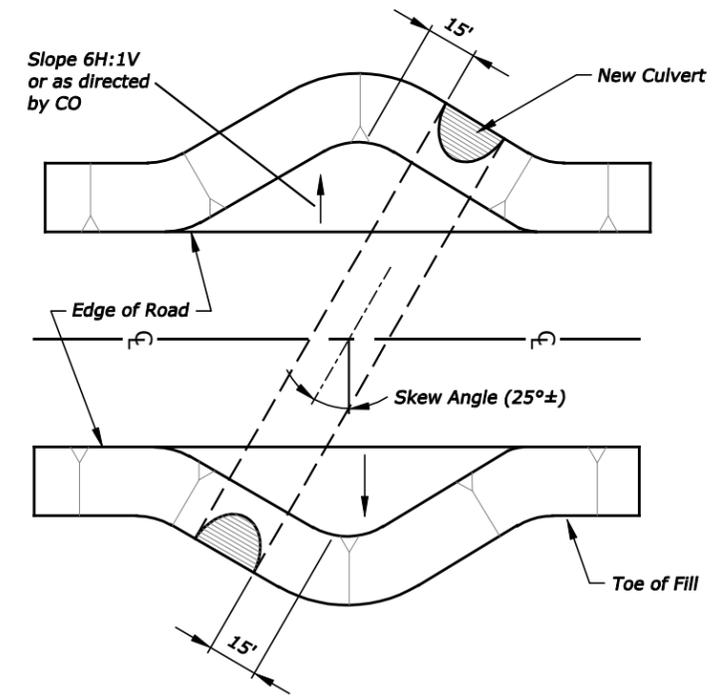


ISOMETRIC VIEW



STA 82+30 to STA 83+40
TYPICAL ROAD SECTION
Not to Scale

CENTERLINE POINTS				
POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
1000	786396.0775	1190768.3084		STA 80+44.31 PC
1001	786440.8635	1190800.5334	5775.91	STA 81+00
1002	786459.9296	1190806.4939	5775.22	STA 81+20
1003	786479.7279	1190809.1529	5774.53	STA 81+40
1004	786499.6910	1190808.4342	5773.84	STA 81+60
1005	786519.2468	1190804.3584	5773.08	STA 81+80
1006	786537.0808	1190797.4123	5772.21	STA 81+99.16
1007	786554.9226	1190786.6955	5771.19	STA 82+20
1008	786570.0201	1190773.6146	5770.26	STA 82+40
1009	786582.6948	1190758.1746	5769.42	STA 82+60
1010	786592.5834	1190740.8177	5768.68	STA 82+80
1011	786599.4025	1190722.0416	5768.03	STA 83+00
1012	786602.9568	1190702.3843	5767.47	STA 83+20
1013	786603.2808	1190684.4545	5767.02	STA 83+37.95 PT
1014	786603.1621	1190682.4080	5766.97	STA 83+40



PLAN VIEW
FILL WARPING DETAILS
Not to Scale



REGION ONE

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ROAD TYPICAL SECTIONS, POINTS & DETAILS

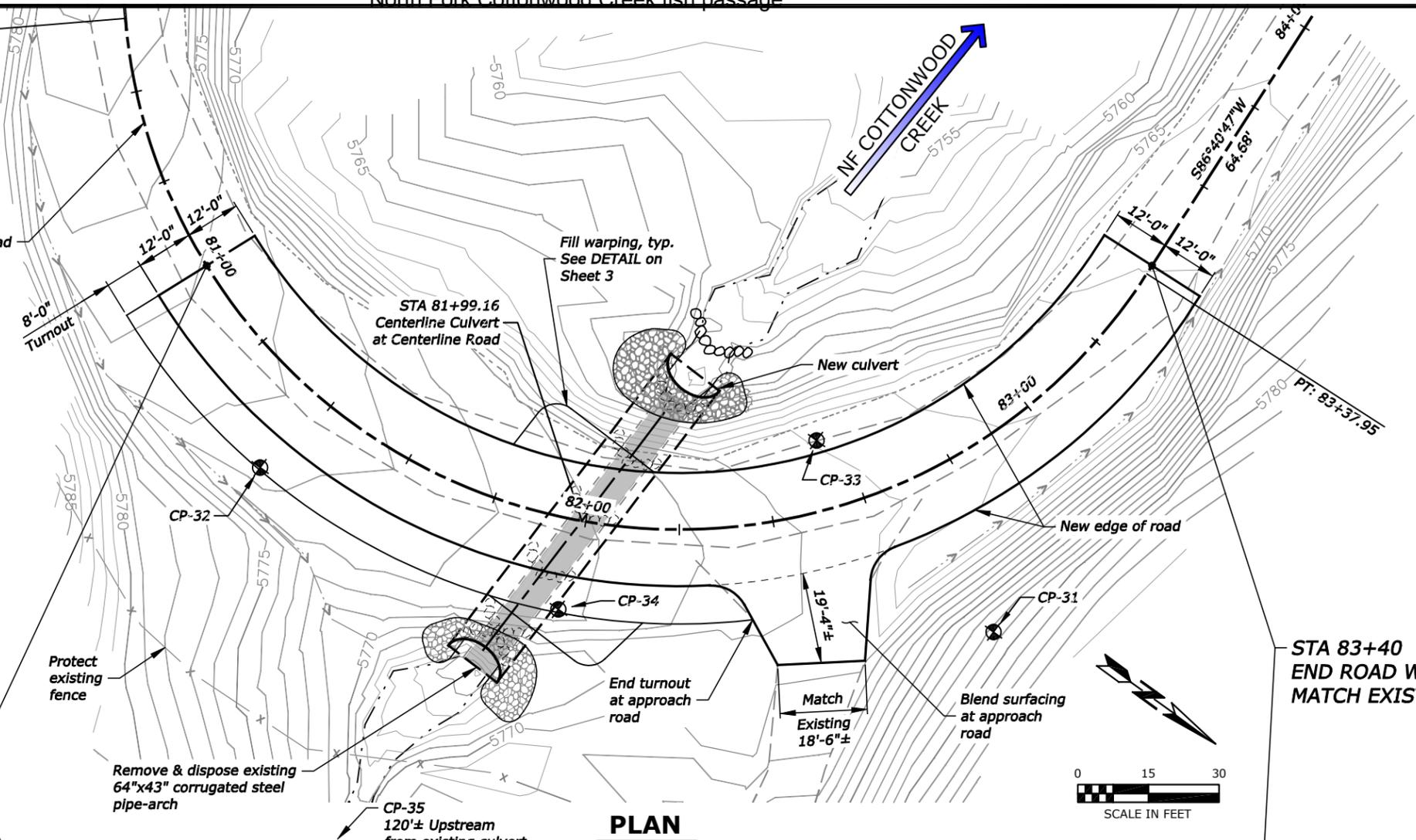
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3	10

LEGEND EXISTING FEATURES

- Existing Edge of Road
- Existing Edge of Shoulder
- █ Existing Culvert
- - - Existing Edge of Water
- x Existing Fence
- - - Existing Ditch
- 4250 Major Contour (5')
- Minor Contour (1')

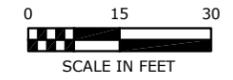
CURVE DATA:
R=118.00
L=293.64'
Δ=142°34'39"

CONTROL POINT TABLE				
POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
CP-30	786592.09	1190428.42	5762.76	SET-RPC
CP-31	786621.64	1190764.98	5778.41	SET-RPC
CP-32	786475.22	1190828.44	5774.42	SET-RPC
CP-33	786567.38	1190754.28	5768.92	SET-RPC
CP-34	786544.11	1190815.48	5772.27	SET-NAIL
CP-35	786523.44	1190955.17	5778.58	SET-NAIL

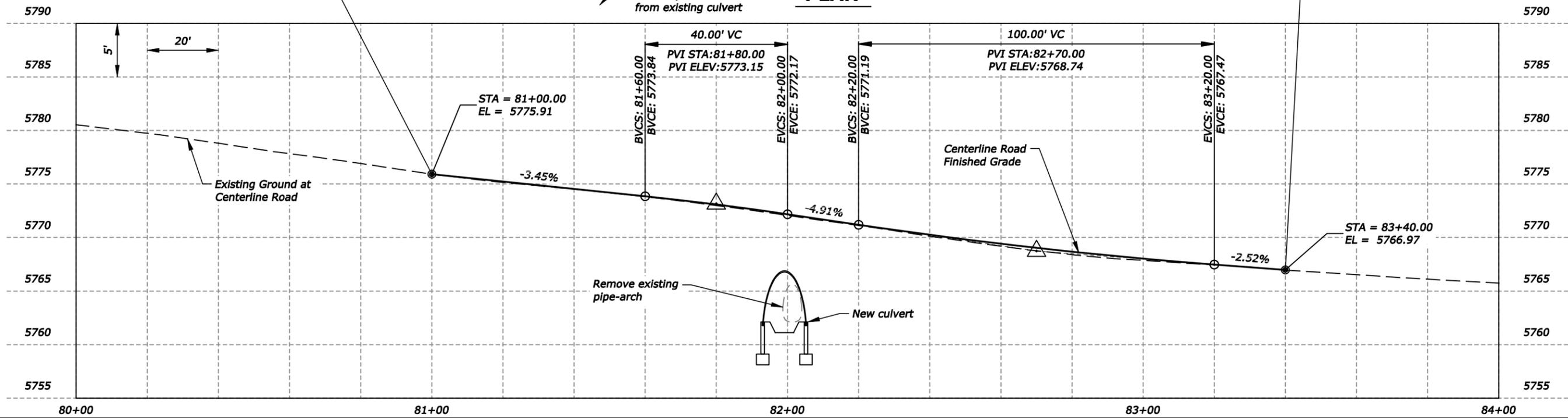


STA 81+00
BEGIN ROAD WORK
MATCH EXISTING

STA 83+40
END ROAD WORK
MATCH EXISTING



PLAN



BY	DATE	REVISION DESCRIPTION

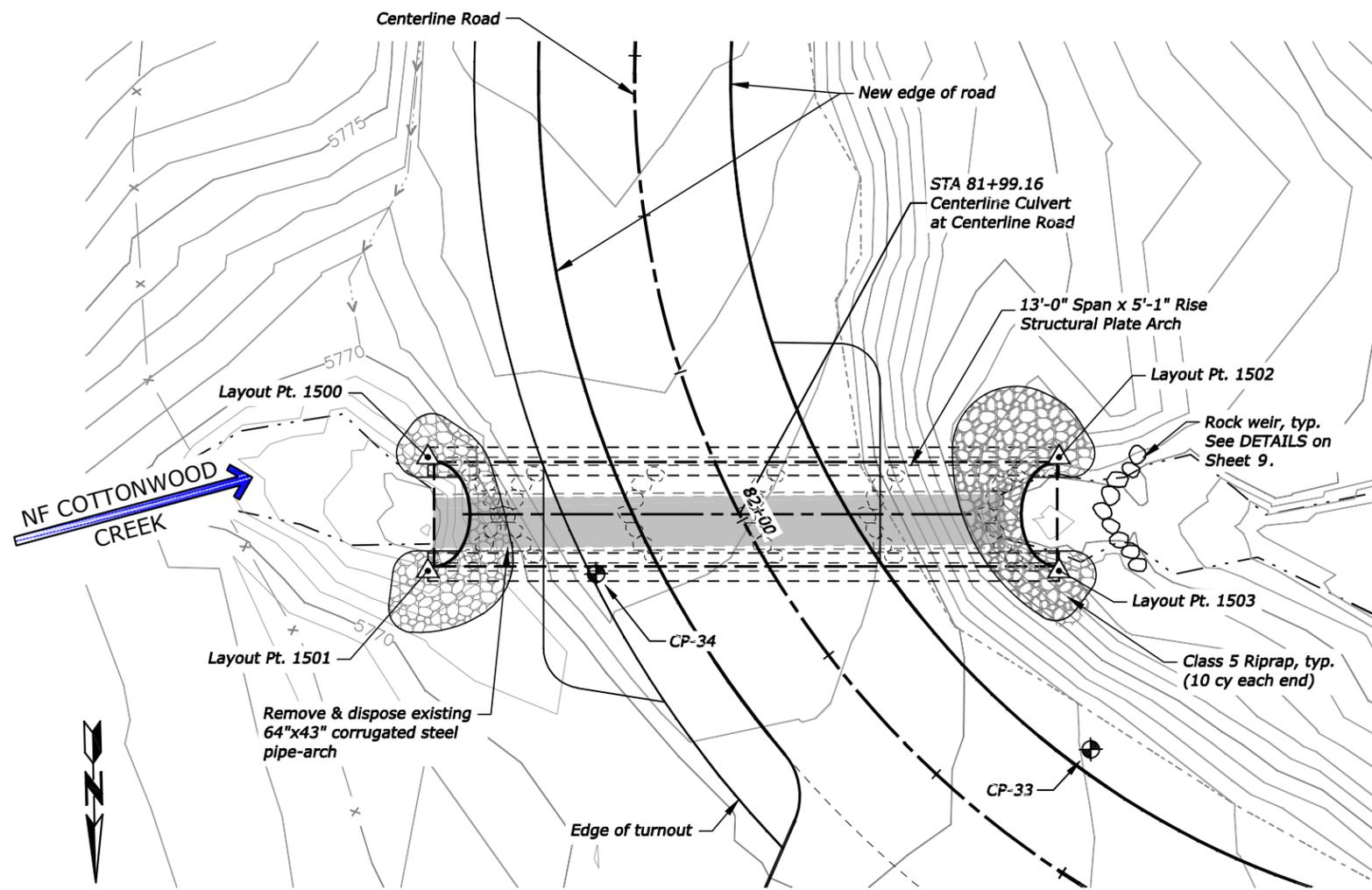
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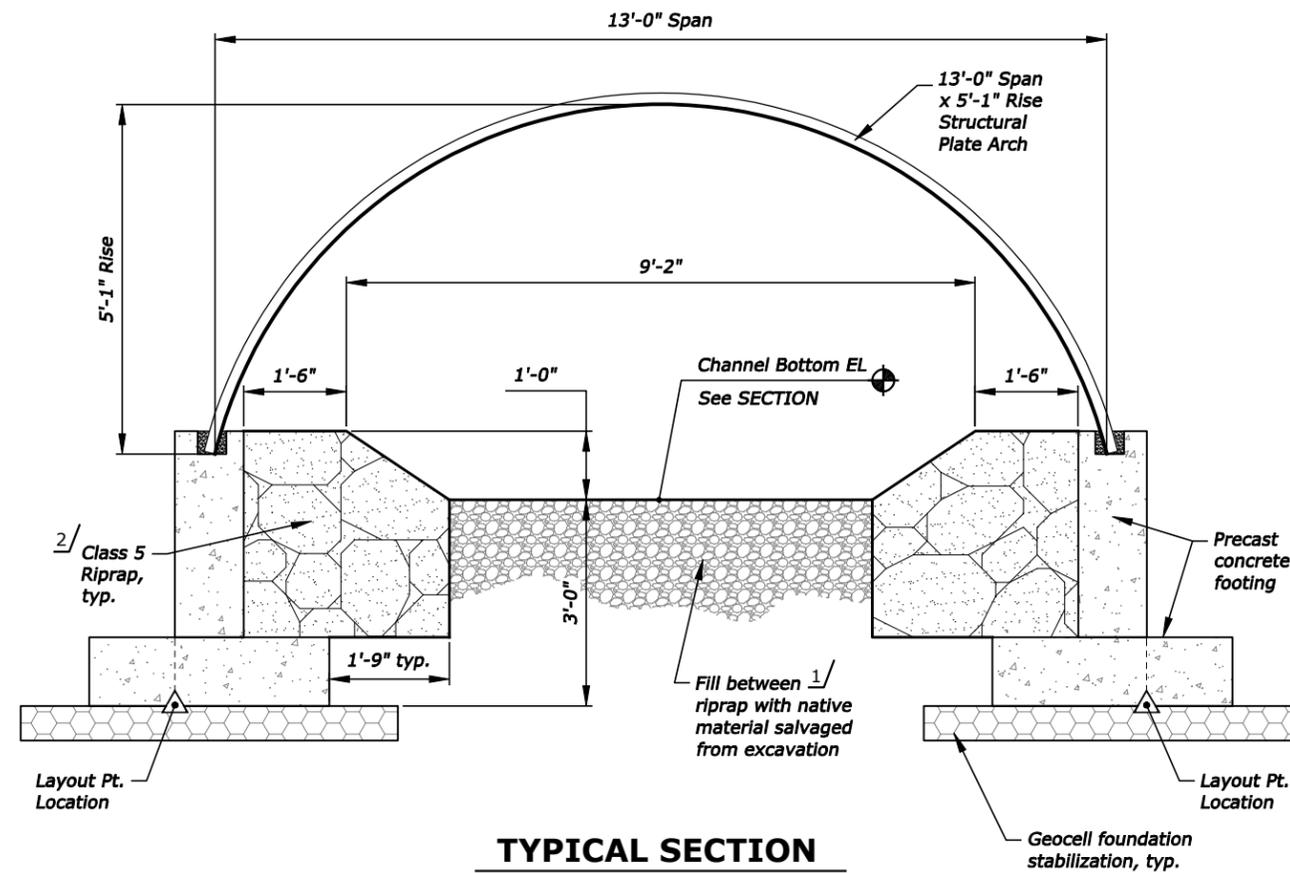
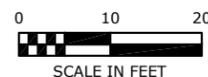
**USFS BEAVERHEAD-DEERLODGE NF
NF COTTONWOOD CREEK
NFSR 1504 MP 10.3**

ROAD PLAN & PROFILE

SHEET	OF
4	10



PLAN

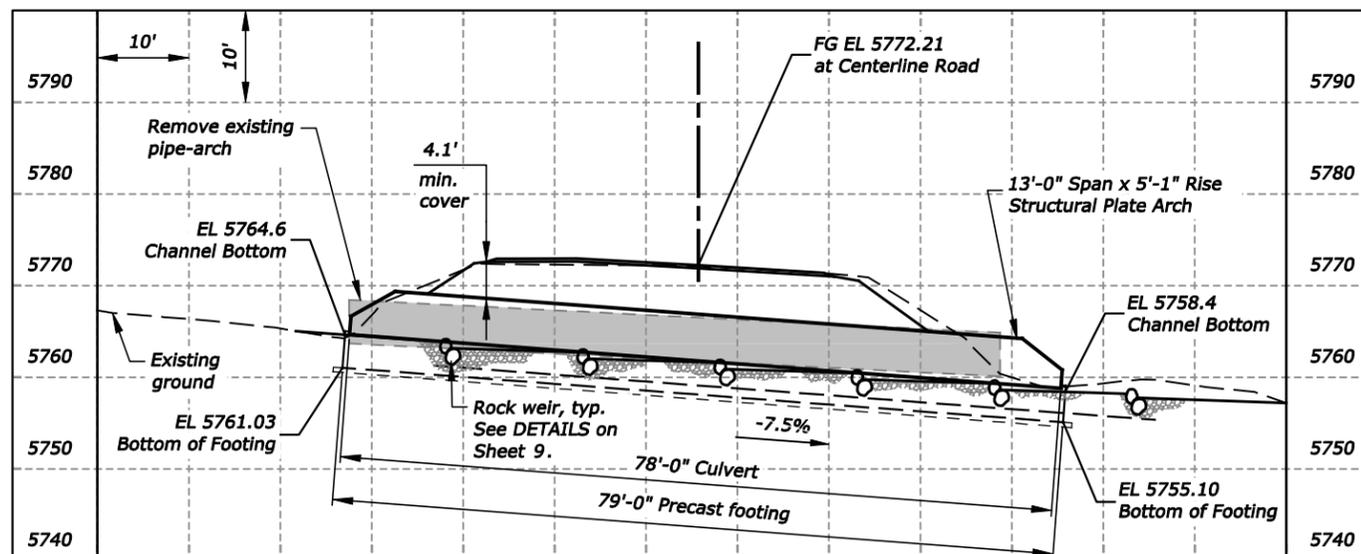


TYPICAL SECTION

Scale: 3/8" = 1'-0"

1/ Fill channel invert over riprap with native material preserved from the excavation. The final mix should be well-graded to produce a dense, well interlocked streambed with low permeability. THE CONTRACTOR IS RESPONSIBLE TO INSURE THAT THE STREAM FLOW DOES NOT GO SUBSURFACE THROUGH THE CULVERT FOR A 48 HOUR PERIOD AFTER RE-WATERING. All work is paid under Item 20806.

2/ Inter-Mix fine native material as directed by CO during placement of riprap to seal voids. Ensure fine material is dispersed throughout the full riprap section.



SECTION THRU CENTERLINE CULVERT

Scale: 1" = 20'

LAYOUT POINTS				
POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
1500	786529.1008	1190836.1401	5761.03	Upstream Layout
1501	786543.2636	1190836.4689	5761.03	Upstream Layout
1502	786530.9291	1190757.3840	5755.10	Downstream Layout
1503	786545.0919	1190757.7128	5755.10	Downstream Layout

HYDRAULIC DATA:
Drainage area= 3.63 sq. mi.
Q2= 27 cfs
Q2 Avg. depth= 1.0 ft
Bankfull width= 13 ft
Q100= 121 cfs
Q100 Avg. depth= 2.1 ft



REGION ONE

BY	DATE	REVISION DESCRIPTION

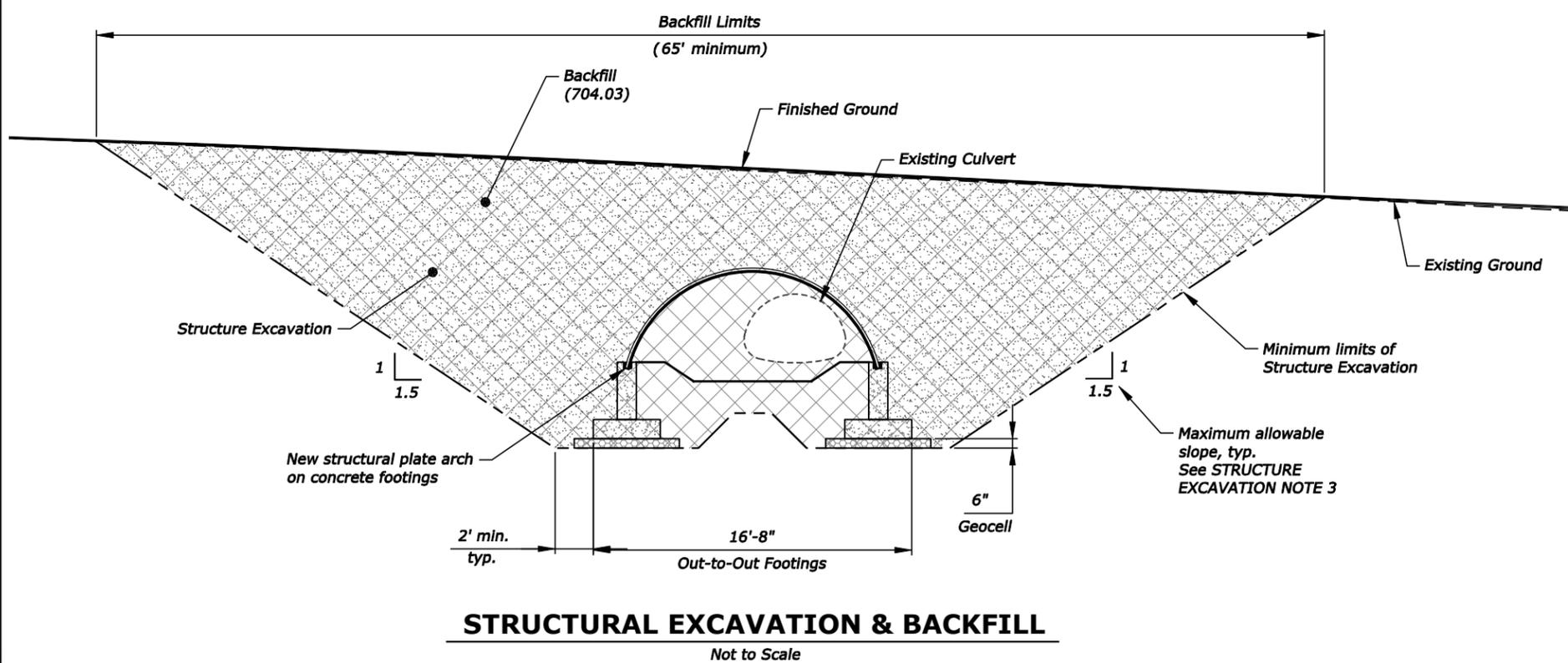
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CULVERT GENERAL LAYOUT

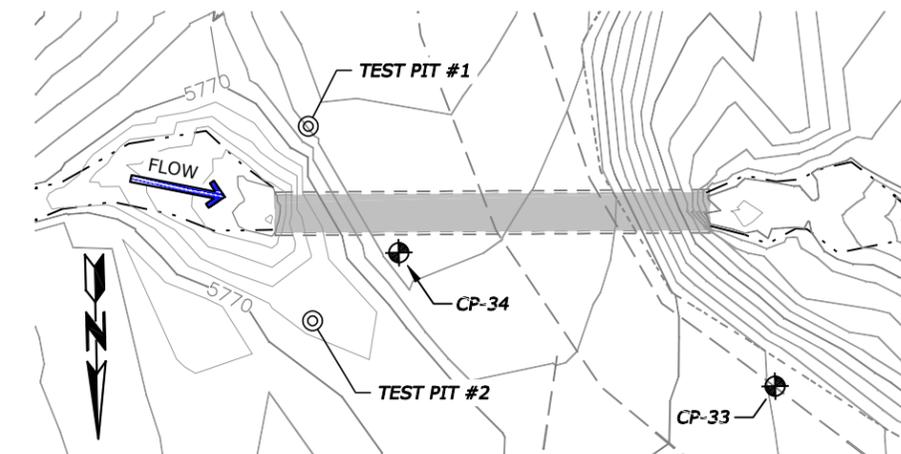
SHEET	
OF	
5	10



STRUCTURAL EXCAVATION & BACKFILL
Not to Scale

SOIL EXPLORATION SUMMARY								
TEST PIT #1								
Depth (ft)	Description	USCS	AASHTO	OSHA (Visual)	% < #200	Plasticity Index	Presumptive Allowable Bearing Pressure Range (tsf)	Suitable for Backfill according to 704.03(a)
0-3	Rock & cobbles with some sand & silt	GP-GC	A-2-4	C	11	7	5	Yes
4-5	Same but wet	no test	no test	B	no test	no test	2.5	-
TEST PIT #2								
0-4	Light brown gravel w/ sand-silt	no test	no test	B	no test	no test	4	-

Soil sample information provided by USFS



SOIL TEST PIT LOCATIONS

STRUCTURE EXCAVATION NOTES:

1. Complete Structure Excavation in accordance with FP-03 Section 208.
2. The contractor is solely responsible for excavation support and compliance with all applicable OSHA regulations.
3. Excavation limits shown comply with OSHA sloping and benching requirements based on Soil Type C (GP-GC Unified Soil Classification). Notify the CO immediately if actual conditions differ.
4. Submit an Excavation Plan for approval prior to beginning the work. As a minimum, the Excavation Plan must include: drawings and a written outline illustrating and describing the proposed excavation limits, methods, equipment to be used, location of stockpiles, and estimated quantities. The Excavation Plan must comply with all applicable OSHA requirements and list the soil type assumed. Changes to the excavation limits shown here for the Contractor's dewatering methods or Contractor convenience must be shown on the Plan and are the responsibility of the Contractor. The Excavation Plan is incidental to the work.
5. Structure Excavation quantity shown is for information only and based on the limits shown. The Contractor is responsible for determining actual quantities based on the approved Excavation Plan.

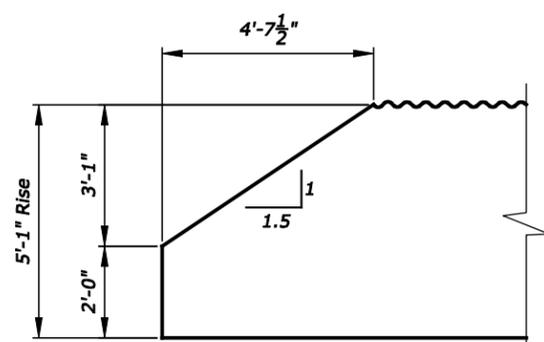
DEWATERING AND SOIL EROSION CONTROL NOTES:

1. Protect against soil erosion and sedimentation during construction in accordance with FP-03 Section 157 and the project permits. Prepare and submit a Soil Erosion and Sediment Control Plan to the CO for approval.
2. Dewater the excavation in accordance with FP-03 Sections 208 and 157 and the requirements on Sheet 10.
3. Contractor should anticipate water infiltrating the excavations.
4. Subgrade excavation, geocell installation, footing placement, riprap placement, and backfill are to be completed in accordance with the contract specifications. Standing or running water in the work area does not relieve the Contractor from meeting the specifications.
5. Dewatering is the sole responsibility of the Contractor. Develop and submit to the CO a project-specific Dewatering and Sediment Control Plan with the Excavation Plan for approval. Sheet 10 illustrates the general dewatering requirements and possible methods and equipment and is not considered adequate or complete for this project. Develop and submit a project-specific Dewatering Plan including drawings and a written outline illustrating and describing proposed layout, methods, equipment and anticipated stream flow volume. Approval of the Contractor's Dewatering Plan does not relieve the Contractor from completing the work as required. If the Contractor's methods are not producing adequate results, the Contractor must re-evaluate and submit another Dewatering Plan. Re-submittal of the Dewatering Plan, if required, is incidental to the work.

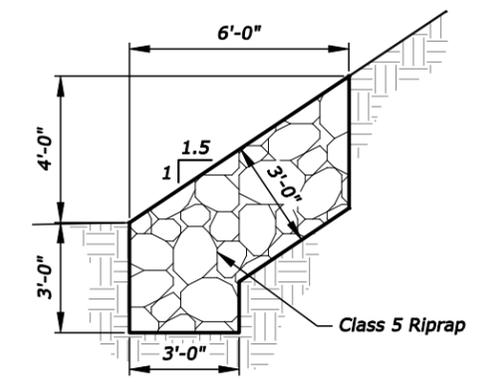
STRUCTURE BACKFILL NOTES:

1. Place Backfill in accordance with FP-03 Section 208 with material meeting the requirements of Section 704.03, Backfill.
2. Backfill limits shown here are the minimum requirements.
3. Any backfill outside the limits shown is considered embankment and must meet the requirements for embankment.
4. It is assumed that material from Structure Excavation at this site will meet the requirements for Backfill. Some mixing and sorting may be required. Approval from the CO must be obtained prior to use.
5. Compact Backfill in accordance with FP-03 Section 208.11 (AASHTO T99, Method C and AASHTO T310) and submit test results to the CO.
6. Backfill quantity shown is for information only and must be verified by the Contractor.

ESTIMATED QUANTITIES			
ITEM	UNIT	QUANTITY	
STRUCTURE EXCAVATION	Cubic Yard	1530	
BACKFILL (704.03)	Cubic Yard	1300	



CULVERT END BEVEL
Not to Scale



RIPRAP DETAIL
Not to Scale



REGION ONE

BY	DATE	REVISION DESCRIPTION

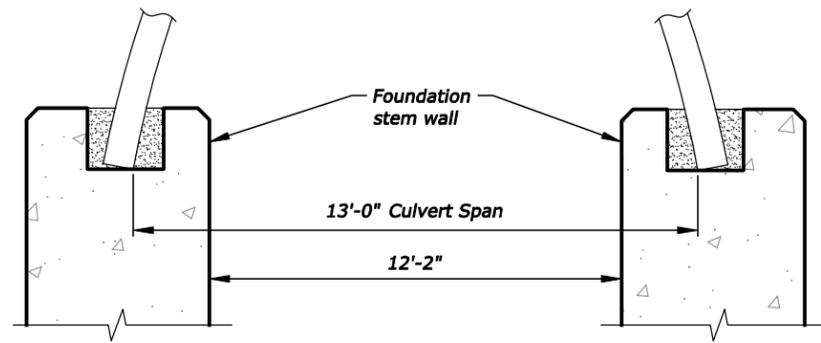
DESIGN	CT	PROJ. NO.	6389
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NF COTTONWOOD CREEK
NFSR 1504 MP 10.3**

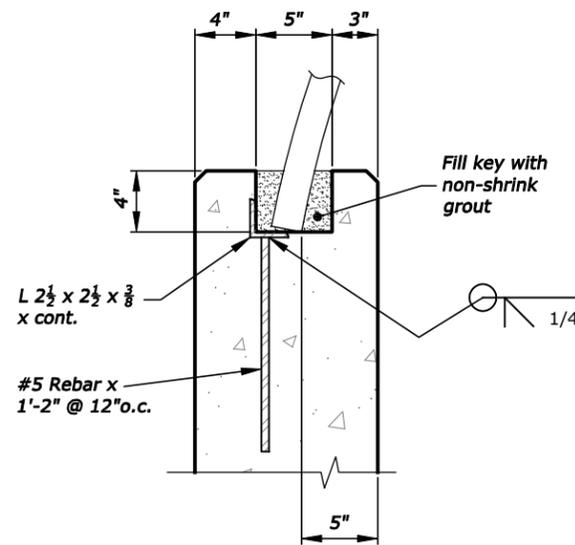
CULVERT DETAILS

SHEET	
OF	
6	10



INSTALLATION DETAIL

Note to Scale



DETAIL A

Note to Scale

FOUNDATION NOTES

1. A limited foundation investigation was conducted at this site. See Sheet 6 for soils information. Notify the CO immediately if bedrock or very soft clay soils are encountered within the limits of the foundations shown in these PLANS. In no case should the footing be placed directly on large boulders, random outcroppings of bedrock, or soft soils without prior approval.
2. Prepare foundation in accordance with Section 208 of the Specifications. Foundation must be approved in writing by the CO prior to placing the geocell.

INFORMATIONAL QUANTITIES

ITEM DESCRIPTION	UNIT	QUANTITY
STRUCTURAL CONCRETE, CLASS A(AE)	Cubic Yard	41
REINFORCING STEEL	Pounds	3350

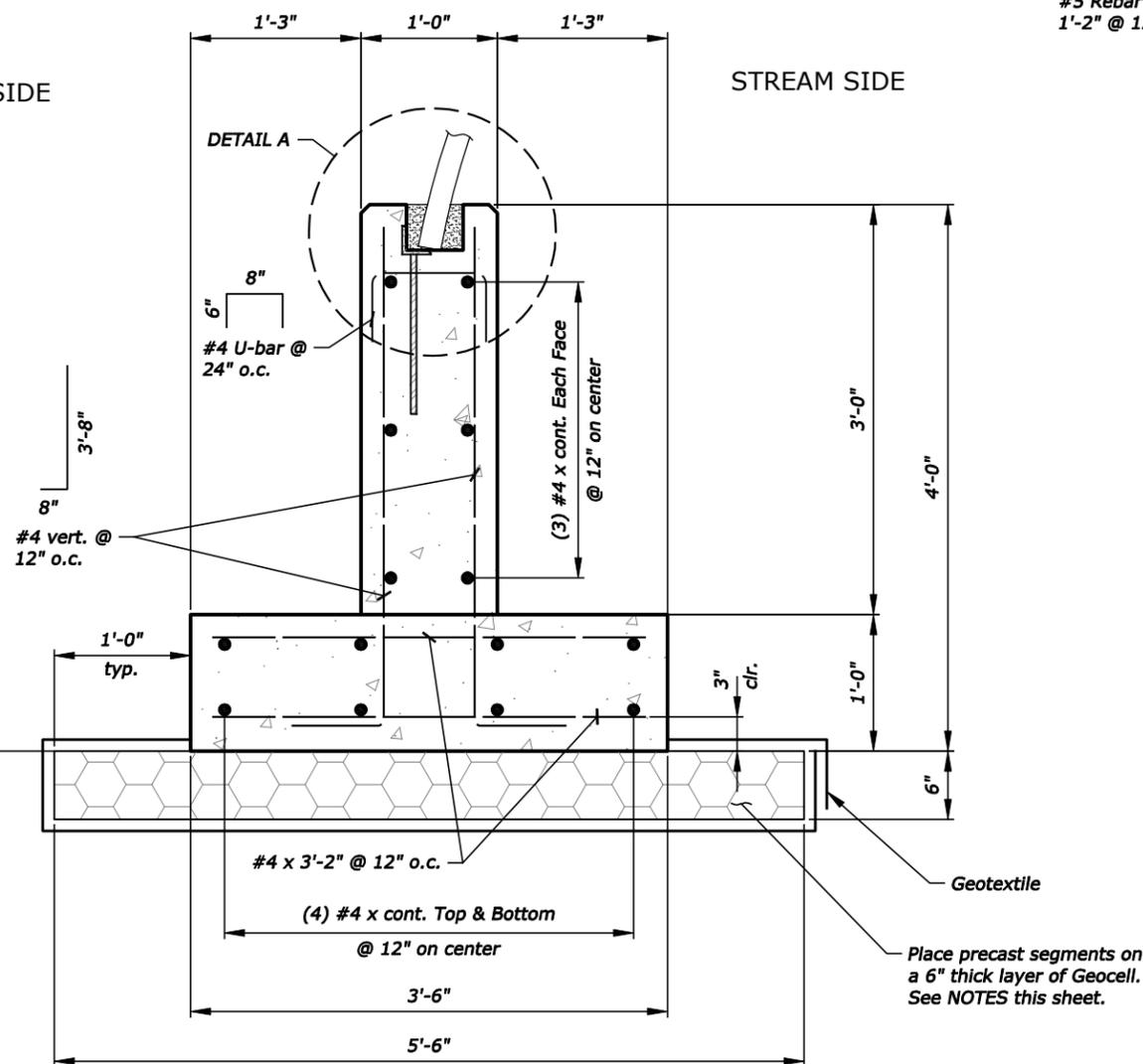
Informational Quantities shown above are for the precast culvert footing and considered incidental to Item 553A02.

NOTES:

1. Provide 2" clear cover for all reinforcement unless otherwise shown.
2. o.c. = on center.
3. Use 24" min. lap splice for all reinf. bars

FILL SIDE

STREAM SIDE



FOOTING DETAIL

Scale: 3/4" = 1'-0"

GEOCELL NOTES:

1. Place Geocell on undisturbed subgrade.
2. Install Geocell in accordance with Forest Service Supplemental Specifications (FSSS) 272.06, holding lines and grades in place with suitable side forms (i.e. "stretcher frames" or steel stakes) to ensure cells are expanded to the minimum dimension required by the manufacturer.
3. Backfill Geocell with coarse granular backfill per FSSS Subsection 703.03(c).
4. Place Type II Geotextile under Geocell and wrap over top after backfilling (incidental to Item 272).
5. Extend Geocell 1' minimum beyond limits of footing on all sides.



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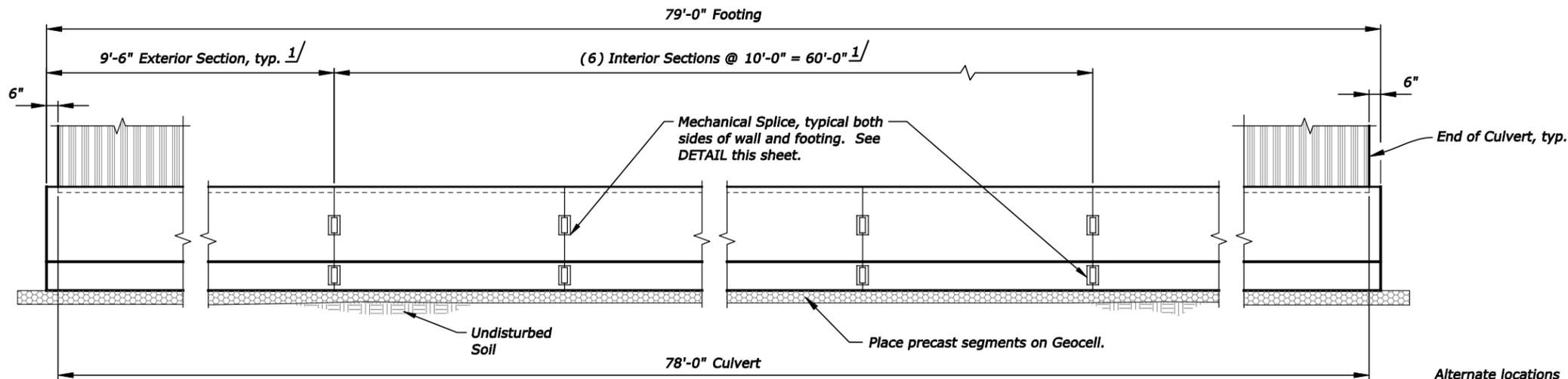
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FOUNDATION DETAILS

SHEET	
OF	
7	10

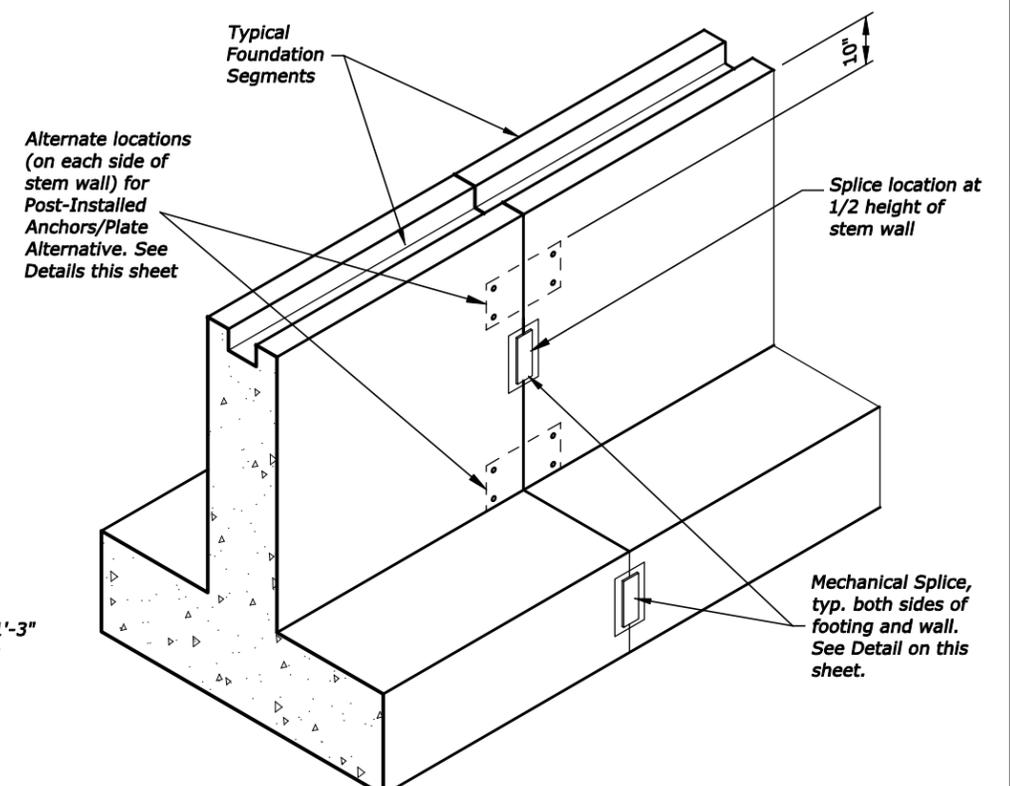


PRECAST FOUNDATION ELEVATION

Not to Scale

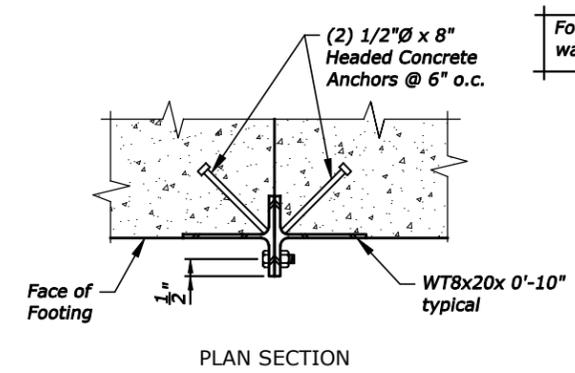
^{1/} Contractor may adjust precast segment lengths shown depending upon setting equipments capabilities. Footing weight is approximately 980 lb/ft.

Prior to fabricating precast footings submit for approval shop drawings detailing segment lengths, splice connections, proposed concrete mix design, pick locations, and selected connection for culvert.
Other precast/prefabricated footing options that meet size, strength and functionality of concrete footings shown may be submitted for review and approval.

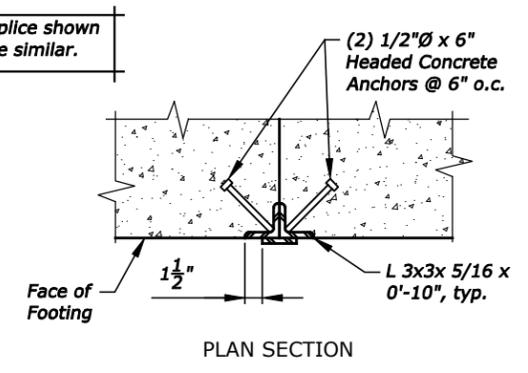


TYPICAL PRECAST SEGMENT

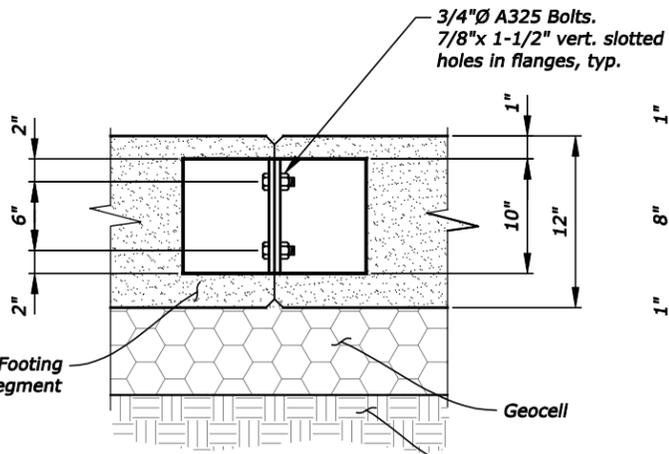
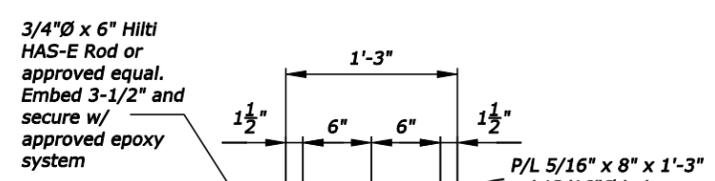
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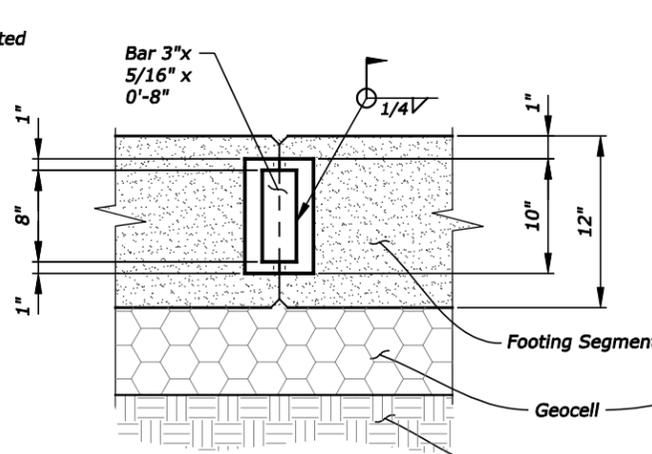
PLAN SECTION



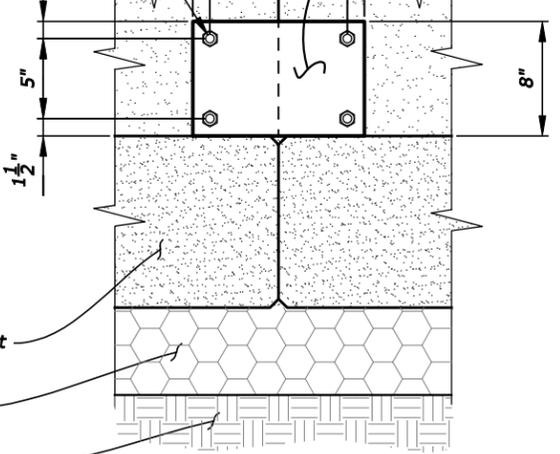
PLAN SECTION



ELEVATION
BOLTED ALTERNATE



ELEVATION
WELDED ALTERNATE



ELEVATION
POST-INSTALLED ANCHORS ALTERNATE

MECHANICAL SPLICE DETAIL

Not to Scale

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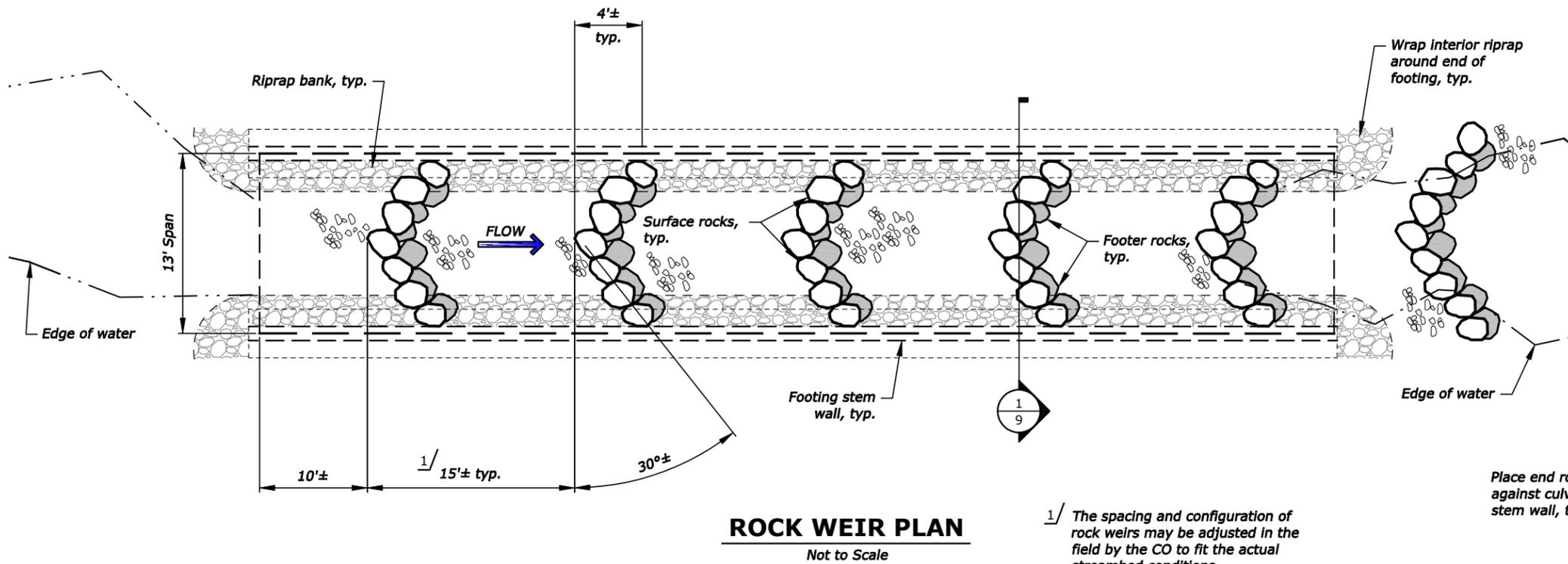
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NFSR 1504 MP 10.3**

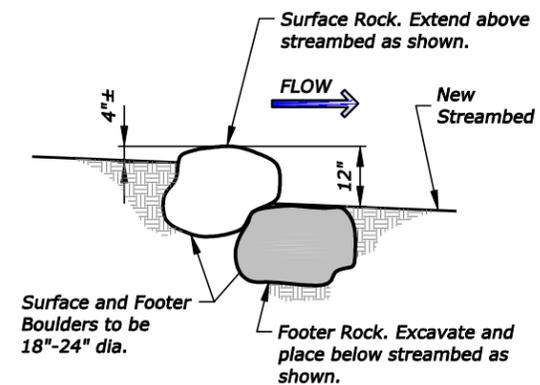
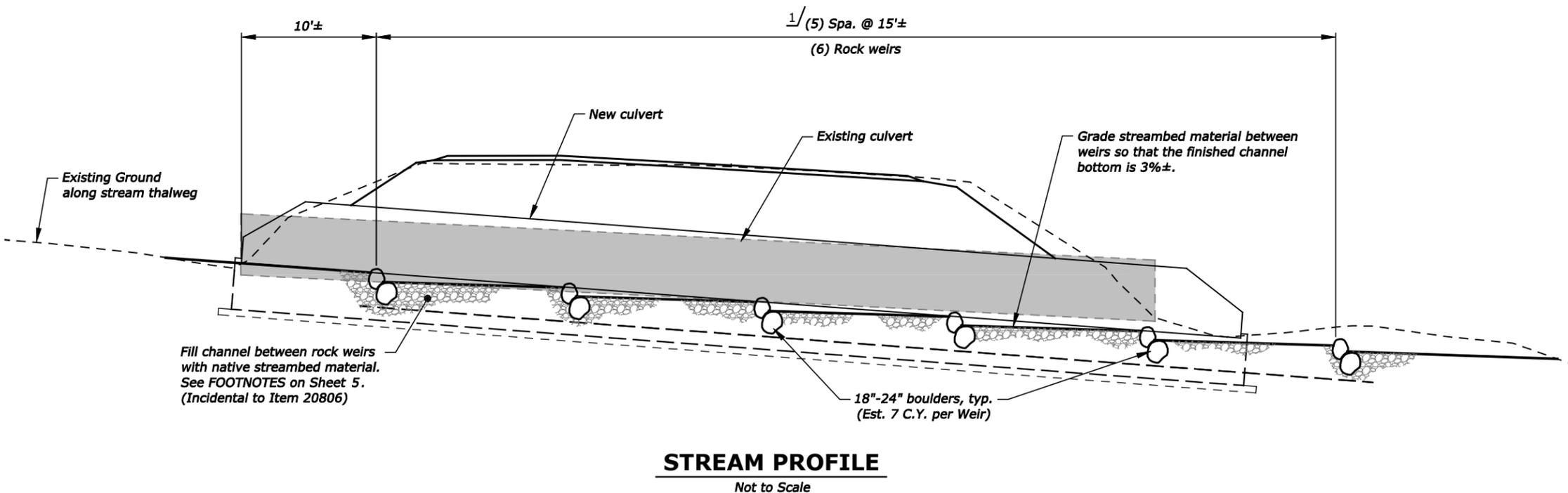
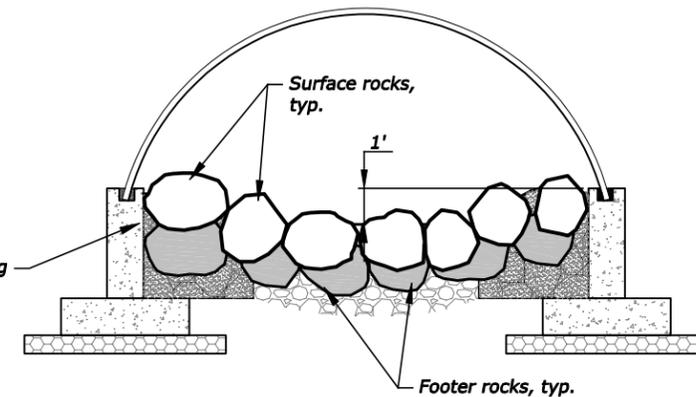
PRECAST FOOTING DETAILS

SHEET	OF
8	10





CULVERT ROCK BANK EXAMPLE



REGION ONE

BY	DATE	REVISION DESCRIPTION

DESIGN	CT	PROJ. NO.	6389
DRAWN	KG	DATE	Mar-15
CHECKED	MJ	SURVEYED	DJA

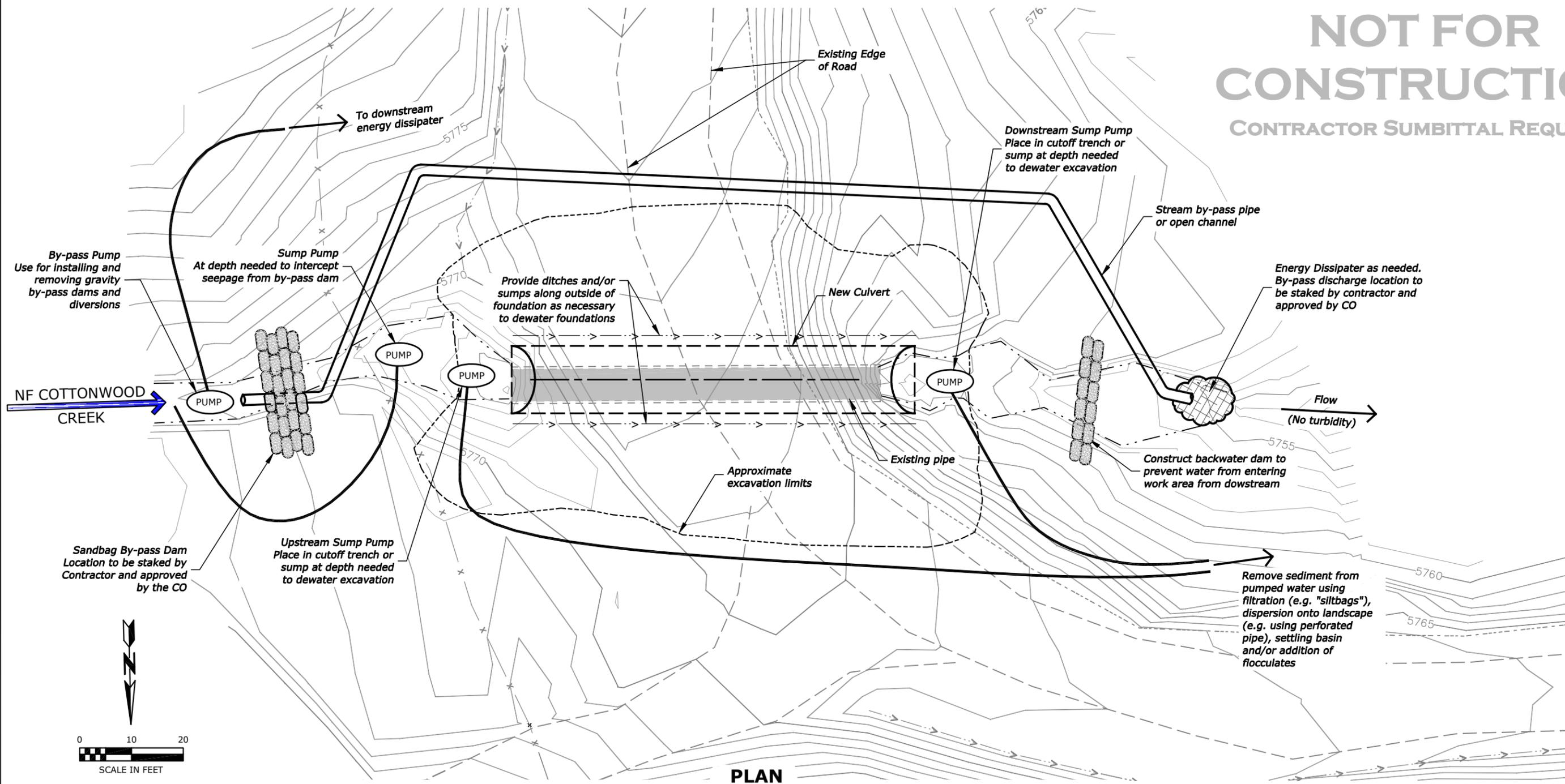
D&A, P.C.
CONSULTING ENGINEERS & LAND SURVEYORS
3203 Russell Street, Missoula, Montana 59801-8591
Phone 406/721-4320 Fax 406/549-6371

**USFS BEAVERHEAD-DEERLODGE NF
NF COTTONWOOD CREEK
NFSR 1504 MP 10.3**

STREAM DETAILS

SHEET	OF
9	10

NOT FOR CONSTRUCTION
 CONTRACTOR SUBMITTAL REQUIRED



PLAN

NOTES:

1. Dewater excavations in accordance with FP-03 Sections 208 and 157 and the requirements shown.
2. Dewatering is the sole responsibility of the Contractor. Develop and submit to the CO a project-specific Dewatering Plan with the Excavation Plan for approval. At a minimum, the Dewatering Plan must include drawings and a written outline illustrating and describing proposed layout, methods, equipment and anticipated stream flow volume. Approval of the Contractor's Dewatering Plan does not relieve the Contractor from completing the work as required. If the Contractor's methods are not producing adequate results, the Contractor must re-evaluate and submit another Dewatering Plan. Re-submittal of the Dewatering Plan, if required, is incidental to the work.
3. This sheet illustrates the general dewatering requirements and possible methods and equipment and is not considered adequate or complete for this project.
4. Contractor is responsible for sizing all pumps, dams, bypass pipe, open channels, and any other means proposed to divert the stream flow.
5. Soil erosion and sediment control measures specific to the Dewatering Plan must be in conformance with the project permits and shown in the Dewatering Plan.



REGION ONE

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**USFS BEAVERHEAD-DEERLODGE NF
 NF COTTONWOOD CREEK
 NFSR 1504 MP 10.3**

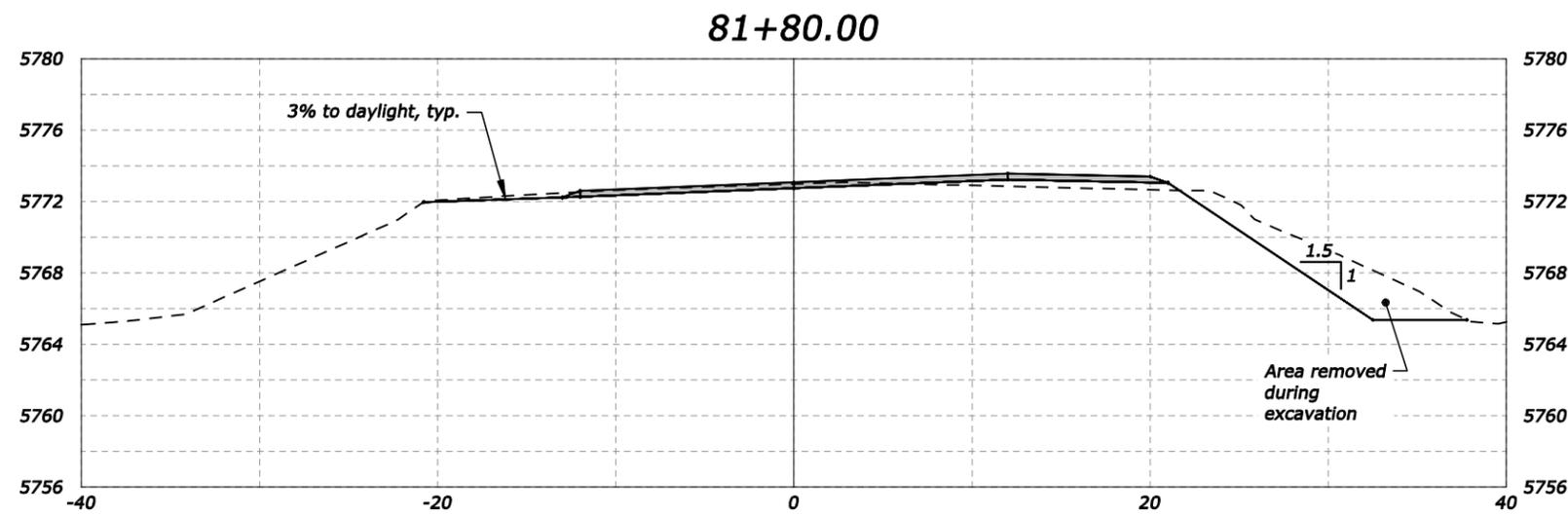
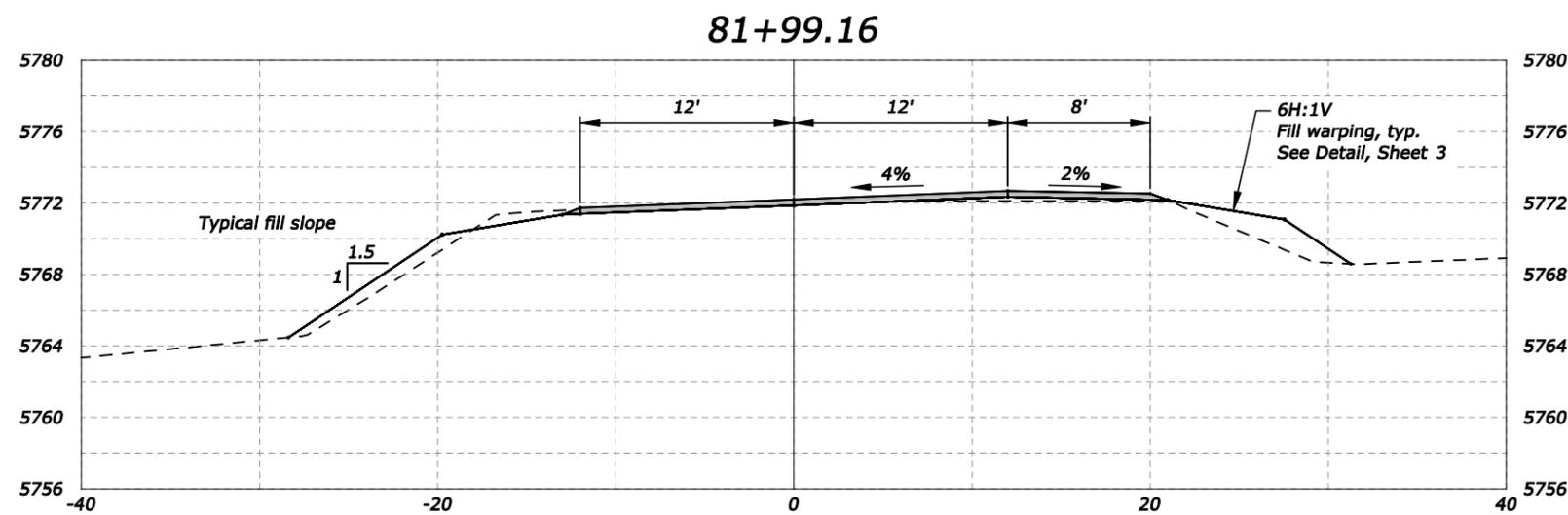
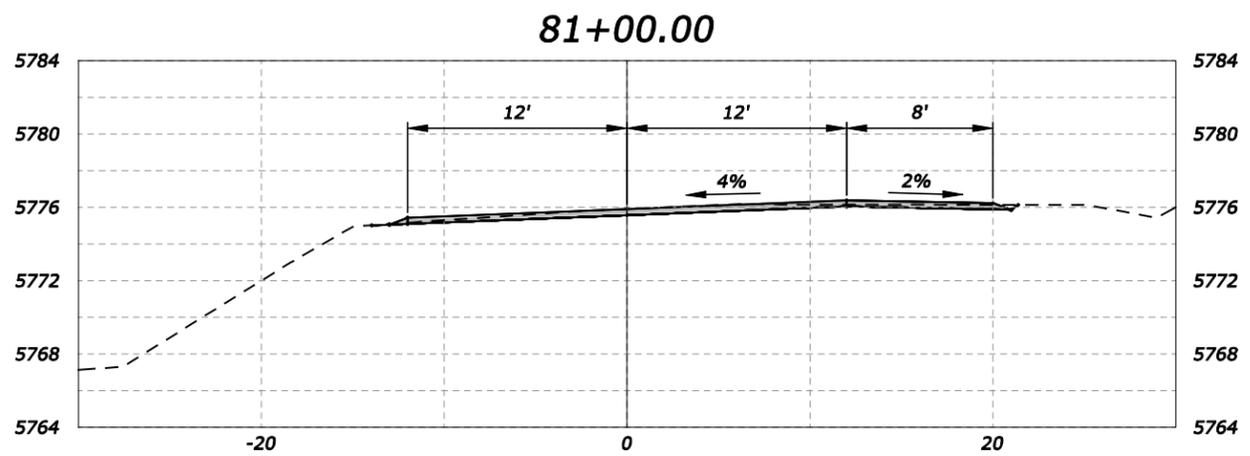
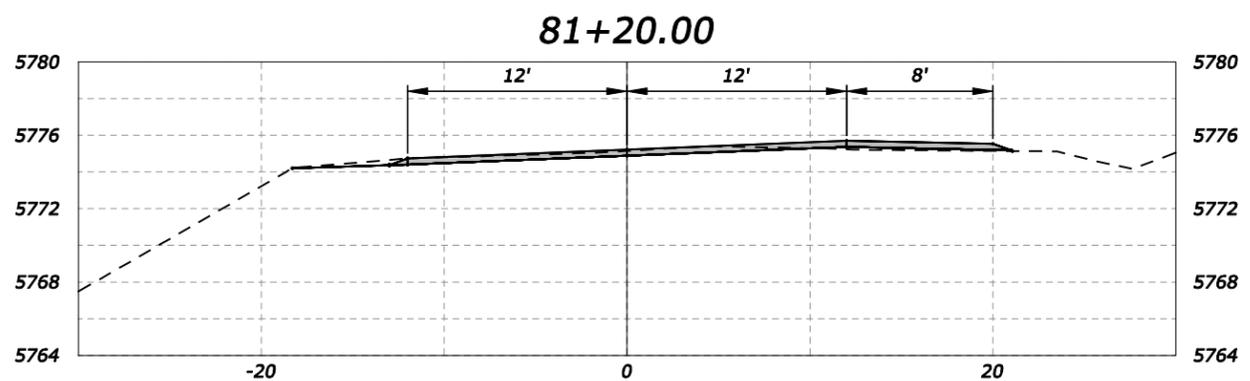
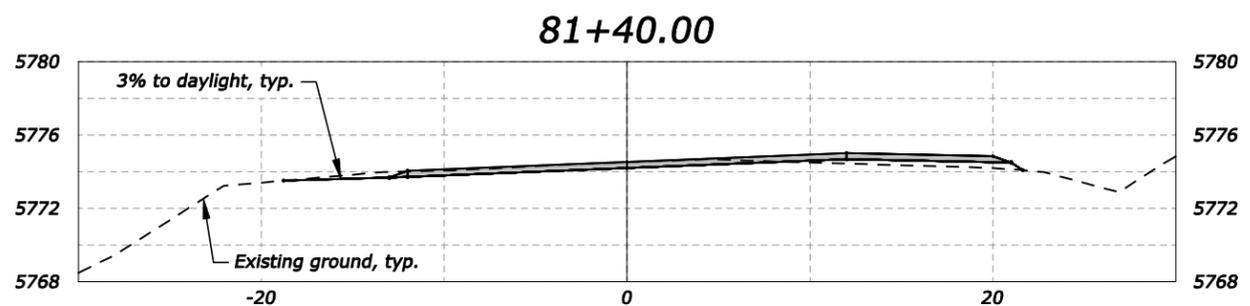
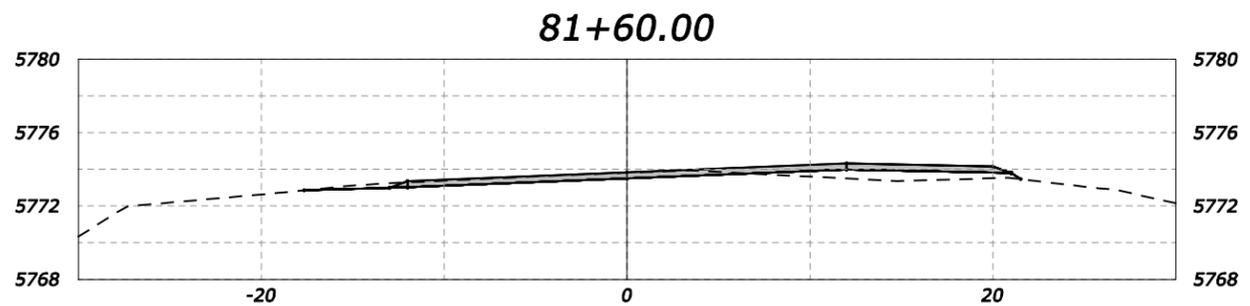
STREAM DEWATERING REQUIREMENTS

SHEET	OF
10	10

NF COTTONWOOD CREEK NFSR 1504 MP 10.3 ROAD CROSS SECTIONS

PREPARED BY : **D&A, P.C.**
CONSULTING ENGINEERS & LAND SURVEYORS
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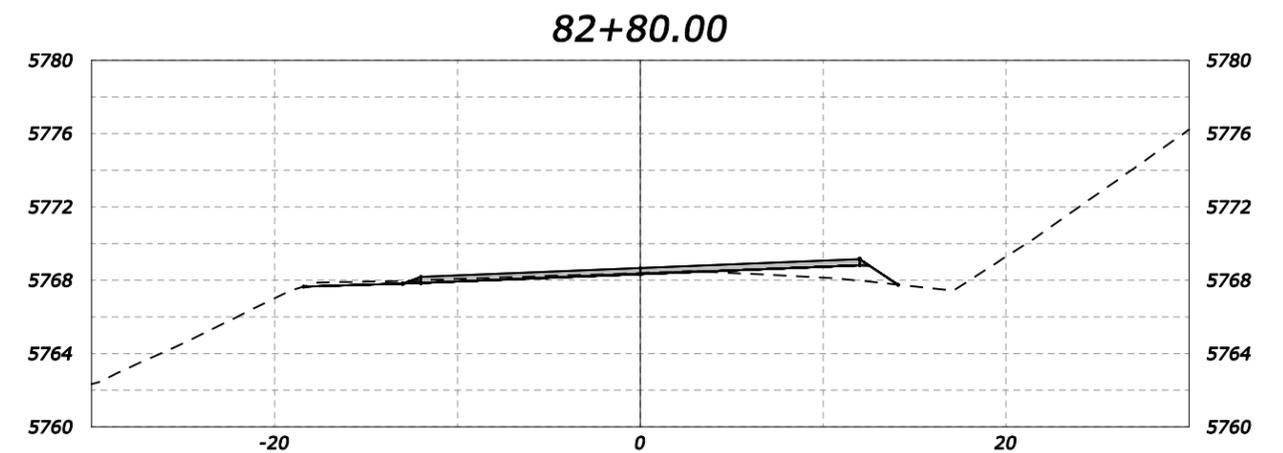
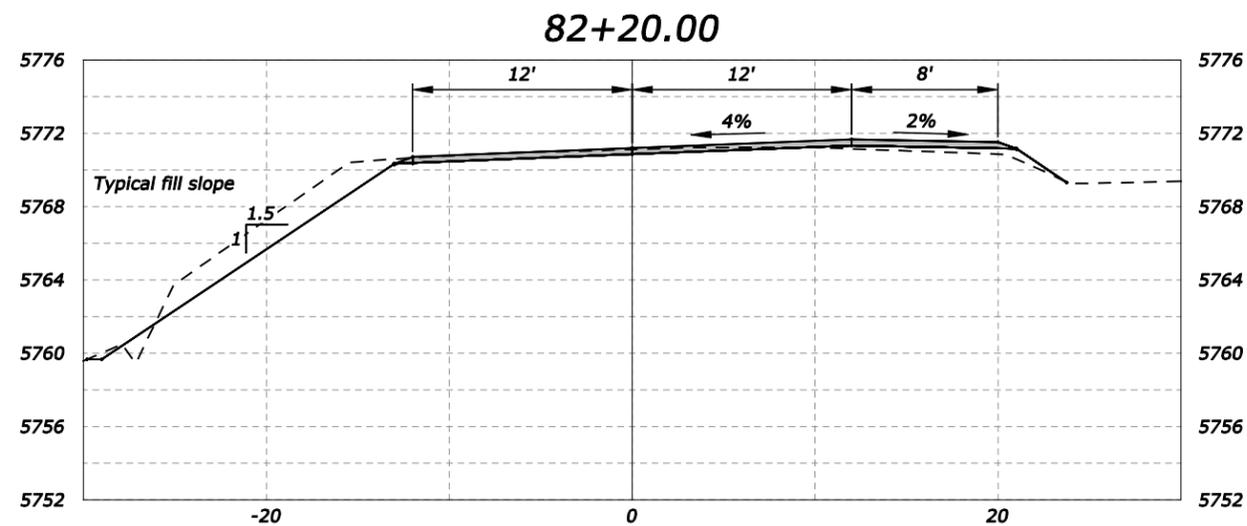
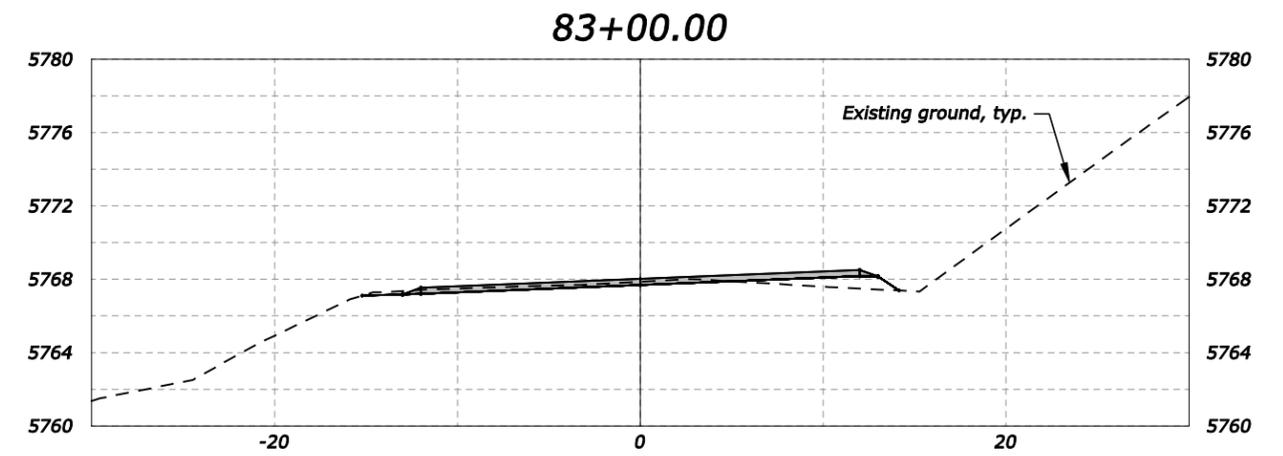
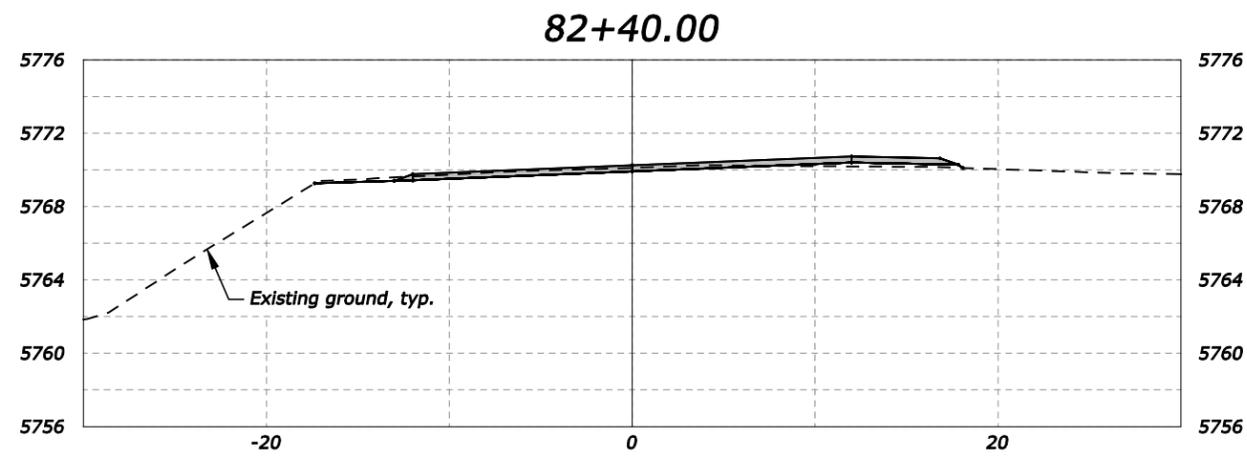
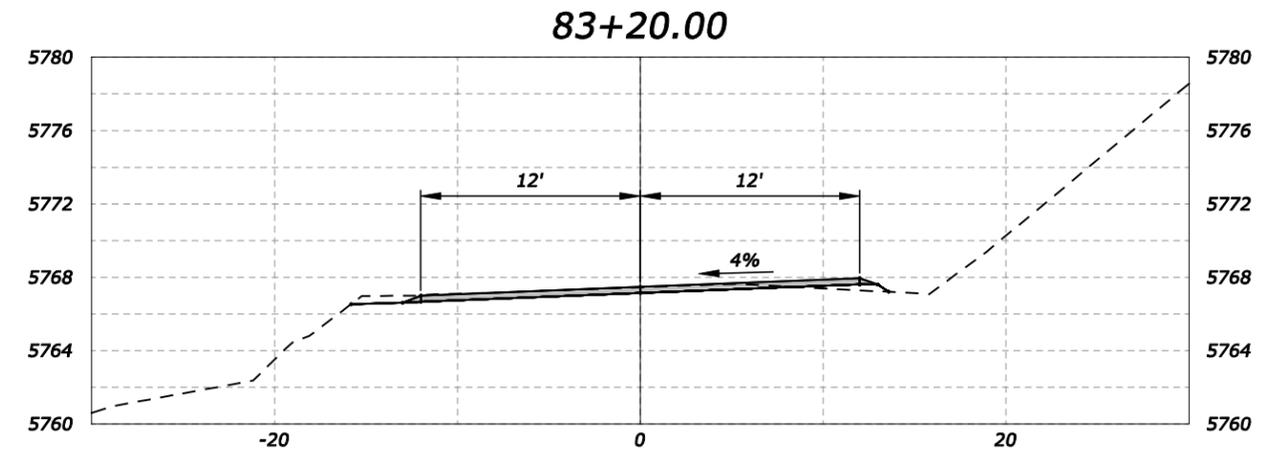
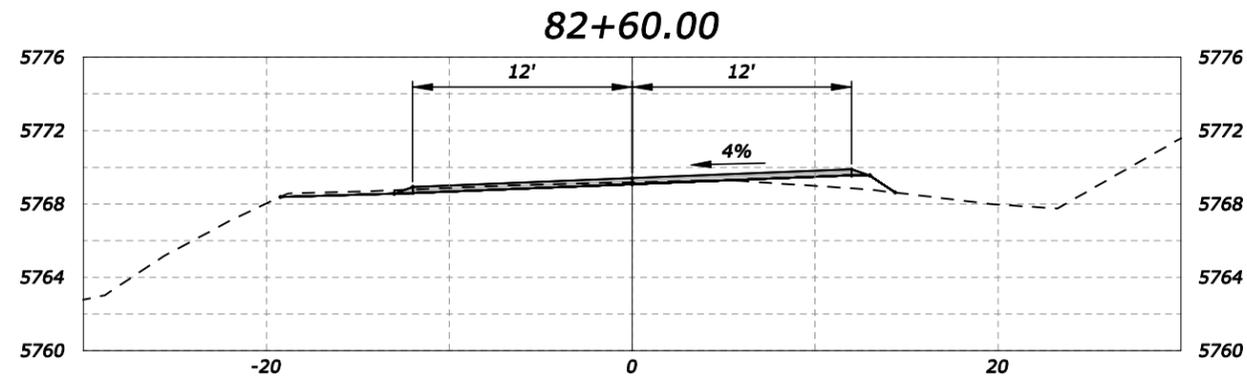
SHEET XS1 OF XS3



**NF COTTONWOOD CREEK
NFSR 1504 MP 10.3
ROAD CROSS SECTIONS**

PREPARED BY : **D&A, P.C.**
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3223 Pennell Street, Missoula, Montana 59701-9021
Phone 406/721-4320 Fax 406/546-8371

SHEET XS2 OF XS3

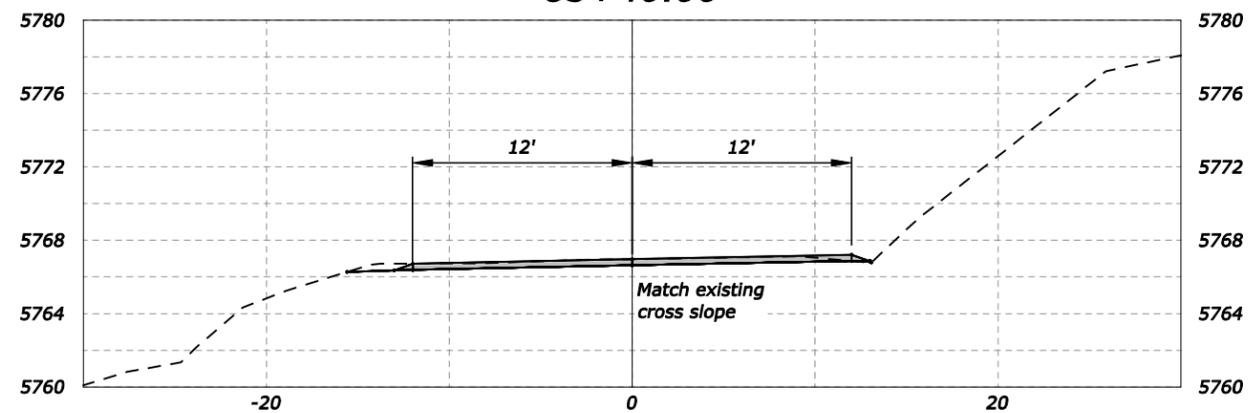


**NF COTTONWOOD CREEK
NFSR 1504 MP 10.3
ROAD CROSS SECTIONS**

PREPARED BY : **DJA, P.C.**
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3223 Turnwell Street, Missoula, Montana 59701-9091
Phone 406/721-4320 Fax 406/546-8371

SHEET XS3 OF XS3

83+40.00



83+37.95

